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CUBIC-FOOT VOLUME TABLES FOR SHORTLEAF PINE

IN THE VIRGINIA-CAROLINA PIEDMONT^{1/}

Available volume tables for shortleaf pine are based on merchantable height and do not show volumes to the small top diameter limits now used in many areas. Volume tables based on total height are also often preferred because they eliminate the error associated with ocular estimates of merchantable height. The table presented here for natural shortleaf pine is based on total tree height and gives volume estimates for the commonly used 4- and 3-inch d. i. b. tops (table 1).

Volume estimates in table 1 are based on measurement of 302 trees from numerous locations throughout the Piedmont region of Virginia, North Carolina, and South Carolina. The data were analyzed by regression techniques and each state was analyzed separately. Tests of significance on the equations from these separate analyses showed that the three states' data were compatible with one another, and the data from all three were then combined into a single equation.

From the combined data, the following two regression equations were derived to express the cubic-foot volume estimates for either the 4- or 3-inch top d. i. b. in the study area:

$$\text{Cubic-foot volume (4-inch top d. i. b.)} = -.337655 + .002835 D^2H$$

$$\text{Cubic-foot volume (3-inch top d. i. b.)} = -.127248 + .002837 D^2H$$

where D is the diameter at breast height and H is total height. Both equations account for about 98 percent of the total variation in the volume per tree.

Slight curvilinearity at the lower end of the estimating curve (D^2H values smaller than 650) made it desirable to fit a curve graphically to that portion of the data. All volume estimates less than 7 cubic feet were slightly affected by this curvilinearity. Volumes in table 1 less than 7 cubic feet were read from this graphically fitted curve rather than computed directly from the regression equations.

^{1/} Tree measurements for South Carolina were supplied by N. B. Goebel, Forestry Department, Clemson College, Clemson, South Carolina.

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Table 1.--Cubic-foot volumes (outside bark) for natural shortleaf pine

TOP DIAMETER 4.0 INCHES INSIDE BARK

D. b. h. (inches)	Total tree height (feet)															
	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	
----- Cubic feet -----																
5	.41	.74	1.15	1.62	2.05	2.47	2.86	3.31	3.73							
6	1.28	1.87	2.47	3.12	3.67	4.33	4.90	5.56	6.20	6.73						
7	2.40	3.21	4.05	4.90	5.76	6.51	7.30	8.00	8.69	9.39						
8		4.80	5.88	6.85	7.83	8.73	9.64	10.55	11.46	12.36	13.27					
9		6.45	7.70	8.85	10.00	11.14	12.29	13.44	14.59	15.74	16.88	18.03	19.18			
10			9.58	11.00	12.42	13.84	15.26	16.67	18.09	19.51	20.93	22.34	23.76	25.18	26.59	
11			11.67	13.38	15.10	16.81	18.53	20.24	21.96	23.68	25.39	27.10	28.82	30.54	32.25	
12					18.03	20.07	22.12	24.16	26.20	28.24	30.28	32.32	34.36	36.40	38.44	
13						23.62	26.01	28.41	30.80	33.20	35.60	37.99	40.39	42.78	45.18	
14						27.44	30.22	33.00	35.78	38.56	41.34	44.12	46.89	49.67	52.45	
15						31.56	34.74	37.94	41.12	44.31	47.50	50.69	53.88	57.07	60.26	
16						35.85	39.58	43.21	46.84	50.47	54.09	57.72	61.35	64.98	68.61	
17							44.72	48.82	52.92	57.01	61.11	65.21	69.30	73.40	77.50	
18								54.78	59.37	63.96	68.55	73.15	77.74	82.33	86.92	
19								61.07	66.19	71.30	76.42	81.54	86.65	91.77	96.89	
20									73.37	79.04	84.71	90.38	96.05	101.72	107.39	
21											93.43	99.68	105.93	112.18	118.44	
22												109.43	116.29	123.16	130.02	
23													127.14	134.64	142.14	
24														138.46	146.63	154.79

TOP DIAMETER 3.0 INCHES INSIDE BARK

5	1.15	1.57	1.92	2.32	2.70	3.05	3.42	3.80	4.18							
6	2.00	2.55	3.07	3.68	4.17	4.72	5.25	5.79	6.35	7.02						
7	3.00	3.75	4.45	5.18	5.95	6.69	7.52	8.21	8.91	9.60						
8		5.10	6.01	7.14	8.04	8.95	9.86	10.77	11.68	12.58	13.49					
9		6.60	7.92	9.06	10.21	11.36	12.51	13.66	14.81	15.96	17.11	18.26	19.40			
10			9.80	11.22	12.64	14.06	15.48	16.90	18.31	19.73	21.15	22.57	23.99	25.41	26.82	
11			11.89	13.60	15.32	17.04	18.75	20.47	22.19	23.90	25.62	27.34	29.05	30.77	32.48	
12					18.26	20.30	22.34	24.38	26.43	28.47	30.51	32.56	34.60	36.64	38.68	
13						23.84	26.24	28.64	31.04	33.43	35.83	38.23	40.63	43.02	45.42	
14						27.68	30.46	33.24	36.02	38.80	41.58	44.36	47.14	49.92	52.70	
15						31.79	34.98	38.17	41.36	44.56	47.75	50.94	54.13	57.32	60.51	
16						36.19	39.81	43.45	47.08	50.71	54.34	57.98	61.61	65.24	68.87	
17							44.97	49.07	53.17	57.26	61.36	65.46	69.56	73.66	77.76	
18								55.02	59.62	64.22	68.81	73.41	78.00	82.60	87.20	
19								61.32	66.44	71.56	76.68	81.80	86.93	92.05	97.17	
20									73.64	79.31	84.98	90.66	96.33	102.00	107.68	
21											93.71	99.96	106.22	112.47	118.73	
22												109.72	116.59	123.45	130.32	
23													127.44	134.94	142.45	
24														138.77	146.94	155.11

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